Section 3.6
Geology and Soils

This section discusses the environmental setting, existing conditions, regulatory context, and potential impacts of the proposed project in relation to geology and soils. The information and analysis in this section is based on the *Geotechnical Investigation* (Geocon 2022; Appendix G-1) and the *Consultation: Limits of Areas of Previous Grading Disturbance, Encinitas Apartments Memorandum* (Geocon 2019; Appendix G-2), both prepared by Geocon, Inc. Additionally, information was taken from the *Paleontological Records Search* prepared by the San Diego Natural History Museum (SDNHM 2022; Appendix G-3). Third party technical reports have been peer reviewed by Michael Baker International and the City of Encinitas.

ENVIRONMENTAL SETTING

Geologic Setting

Regional Geology

The project area is situated in the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California; it varies in width from approximately 30 to 100 miles. The province is characterized by mountainous terrain on the east composed mostly of Mesozoic igneous and metamorphic rocks, and relatively low-lying coastal terraces to the west underlain by late Cretaceous-age, Tertiary-age, and Quaternary-age sedimentary units. Most of the coastal region of San Diego County occurs on these coastal terraces and is underlain by sedimentary units.

Site-Specific Geology

Based on field exploration and observations conducted for the Geotechnical Evaluation, the site is generally underlain by three surficial soil deposits including previously-placed fill, landslide debris, and alluvium; and two geologic units including Quaternary-age Very Old Paralic Deposits and Eocene-age Santiago Formation. The previously placed fill encountered during borings taken on-site extended to a depth of approximately 15 feet below grade. The fill material was found to be loose to very dense, clayey, fine to coarse sand and included organic materials and small amounts of gravel. Alluvium was encountered at the southern portion of the site beneath the previously placed fill material to a maximum depth of 55 feet below grade. The alluvium was found to be medium dense, clayey to silty, fine to coarse sand. Landslide debris was also encountered at the western portion of the project site, at an area approximately 140 feet from Piraeus Street (Geocon 2022).

Very Old Paralic Deposits were encountered above grade throughout most of the project site and were found to be composed of medium to dense, fine to coarse sand, which included cobble and sand layers. The Santiago Formation was encountered between 14 and 32 feet below grade at the project site and between 50 and 55 feet below grade beneath on-site alluvium. The Santiago Formation was also encountered above grade at the northern drainage and adjacent to Piraeus Street. These materials were composed of dense to very dense, moist, silty, fine to coarse sandstone as well as hard, moist, claystone (Geocon 2022).

Under current conditions, approximately 12,025 square feet (0.28 acres) of existing steep slopes on the project site are manufactured. A slope excavation along the western property margin is present and presumed to be associated with former grading that occurred with construction of Piraeus Street and Interstate 5. The northern portion of the slope included installation of a concrete brow ditch. These on-site cut slopes range from approximately 10 to 15 feet in height (Geocon 2019). Other surficial disturbance is visible from creation of an off-road bike course and associated trails and ramps.

Additionally, in 2001, a landslide occurred on-site that closed adjacent Piraeus Street. The landslide occurred along the cut slope north of Plato Place that temporarily closed Piraeus Street (Geocon 2019). The western property margin currently contains the landslide remnant with an upper scarp area that has down dropped approximately 5 to 10 feet. During landslide remediation, the City of Encinitas removed portions of the slide and installed two groundwater observation wells and two horizontal drains. The cut area is located above the existing landslide and was the source for the fill. The excavated soil was placed within a depression on the southern portion of the property. The lower portion of the slope face adjacent to Piraeus Street was track walked with a bull dozer during repair operations (Geocon 2022).

Seismic and Geologic Hazards

During the Pliocene, several new faults developed in Southern California, creating a new tectonic regime superposed on the flat-lying section of Tertiary and late Cretaceous rocks in the San Diego region. One of these fault systems is the Rose Canyon Fault Zone.

The principal known onshore faults in southernmost California are the San Andreas, San Jacinto, Elsinore, Imperial, and Rose Canyon faults. Principal offshore faults include the Coronado Bank, Descanso, San Diego Trough, and San Clemente faults, located off the San Diego and northern Baja California coastlines. The majority of the offshore faults coalesce south of the international border, where they come onshore as the Agua Blanca fault, which transects the Baja California peninsula.

Active Faults

The US Geological Survey defines an active fault as a fault that has had surface displacement within Holocene times (approximately the last 11,000 years) and therefore is considered more likely to generate a future earthquake. California's Alquist-Priolo Earthquake Fault Zoning Act requires the State Geologist to establish regulatory zones (known as earthquake fault zones) around the surface traces of active faults that pose a risk of surface ground rupture, and to issue appropriate maps to mitigate the hazard of surface faulting to structures for human occupancy and prevent the construction of buildings used for human occupancy on the surface trace of active faults. No known active or potentially active faults transect or project toward the site (CGS 2010). In addition, the site is not located within an earthquake fault zone mapped by the state. The nearest known active faults are the Newport-Inglewood Fault and Rose Canyon Fault Zone, located approximately 13 miles west of the site.

Ground Shaking

Ground shaking is the earthquake effect that produces the vast majority of damage, and is the most common effect of earthquakes that adversely impacts people, animals, and constructed improvements. Several factors control how ground motion interacts with structures, making the hazard of ground shaking difficult to predict. Earthquakes, or earthquake-induced landslides, can cause damage both near and far from fault lines. Damage to public and private buildings and infrastructure can threaten public safety and result in significant economic loss. Seismic waves propagating through the earth's crust are responsible for the ground vibrations normally felt during an earthquake. Seismic waves can vibrate in any direction and at different frequencies, depending on the frequency content of the earthquake rupture mechanism and the path and material through which the waves propagate. The earthquake rupture mechanism is the distance from the earthquake source, or epicenter, to an affected site.

According to the Geotechnical Investigation, the risk associated with strong ground motion due to an earthquake at the site is considered to be high; however, such risk is no greater than that for the surrounding region (Geocon 2022). The primary seismic hazard is the risk for ground shaking to occur in response to a large-magnitude earthquake during the lifetime of the planned development.

Additionally, the California Building Code (CBC) defines different Seismic Design Categories based on building occupancy type and the severity of the probable earthquake ground motion at the site. The six Seismic Design Categories are designated A through F, with Category A having the least seismic potential and Category F having the highest seismic potential. The Geotechnical Investigation identifies the site as Site Class D "Stiff Soil" per the CBC and American Society of Civil Engineers (Geocon 2022).

Erosion

Grading and construction can loosen surface soils and make soils susceptible to the effects of wind and water movement across the surface. Based on on-site conditions, exposed on-site soils may be subject to soil erosion during project ground disturbing activities.

Paleontological Resources

The project site is generally underlain by Quaternary-age Very Old Paralic Deposits and Santiago Formation. Very Old Paralic Deposits formed during the early to middle Pleistocene-age (1.5 to 0.5 million years ago) underlie the majority of the project site. Quaternary-age Very Old Paralic Deposits are considered to have a moderate paleontological sensitivity. Limited areas in the northern and western portions of the project site are underlain by the Santiago Formation (approximately 49 to 40 million years old). The Santiago Formation is exposed in the natural slopes within the drainage to the north of proposed project site and in the adjacent to Piraeus Street. The Santiago Formation has produced trace fossils (e.g., burrows) and fossilized impressions or remains of plants (e.g., tropical mangrove), marine invertebrates (e.g., snails, mussels, oysters, clams, tusk shells, starfish, and brittle stars), and marine vertebrates (e.g., rays). The Santiago Formation is considered to have a high paleontological sensitivity.

REGULATORY FRAMEWORK

State

California Building Code

The State of California establishes minimum standards for building design and construction through the California Building Code (California Code of Regulations, Title 24). The CBC is based on the Uniform Building Code, which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for conditions in California. State regulations and engineering standards related to geology, soils, and seismic activity in the Uniform Building Code are reflected in the CBC requirements.

The CBC contains specific requirements for seismic safety, excavation, foundations, retaining walls, and site demolition. It also regulates grading activities, including drainage and erosion control.

Regional

San Diego County Multi-Jurisdictional Hazard Mitigation Plan

In 2010, San Diego County and 18 local jurisdictions, including the City of Encinitas, adopted the Multi-Jurisdictional Hazard Mitigation Plan (MHMP). The MHMP is a countywide plan that identifies risks and ways to minimize damage by natural and man-made disasters. It is a comprehensive document that serves many purposes, including creating a decision tool for management, promoting compliance with state and federal program requirements, enhancing local policies for hazard mitigation capability, and providing interjurisdictional coordination. The City's specific hazard mitigation goals, objectives, and related potential actions for earthquake hazards are included in the MHMP.

The MHMP was last revised in 2018. The plan is currently being reviewed and revised to reflect changes to both the hazards threatening San Diego as well as the programs in place to minimize or eliminate those hazards (County of San Diego n.d.).

Local

City of Encinitas General Plan

The City's General Plan is the primary source of long-range planning and policy direction used to guide growth and preserve the quality of life in Encinitas. The General Plan states that a goal of the City is to analyze proposed land uses to ensure that the designations would contribute to a proper balance of land uses in the community. Goals and policies relevant to the proposed project are listed below.

Land Use Element

GOAL 8: **Environmentally and topographically sensitive and constrained areas within the City shall be preserved to the greatest extent possible to minimize the risks associated with development in these areas.**

Policy 8.1: Require that any improvement constructed in an area with a slope of more than 25% and other areas where soil stability is at issue to submit soils and geotechnical studies to the City for review and approval. These studies shall document that the proposed development will not adversely affect hillside or soil stability and that no future protective measures will be required.

Resource Management Element

GOAL 13: **Create a desirable, healthful, and comfortable environment for living while preserving Encinitas' unique natural resources by encouraging land use policies that will preserve the environment.**

Policy 13.1: The City shall plan for types and patterns of development which minimize water pollution, air pollution, fire hazard, soil erosion, silting, slide damage, flooding, and severe hillside cutting and scarring.

GOAL 14: **The City shall stringently control erosion and sedimentation from land use and development to avoid environmental degradation of lagoons and other sensitive biological habitat, preserve public resources, and avoid the costs of dealing with repair and sedimentation removal.**

Policy 14.1: The best strategy to reduce erosion and sedimentation is to reduce to the maximum extent feasible, grading and removal of vegetation. It is the policy of the City that, in any land use and development, grading and vegetation removal shall be limited to the minimum necessary.

Policy 14.3: The City will reduce the rate of sedimentation of the lagoons by requiring procedures for controlling runoff and erosion associated with upland grading and development based on a minimum 10-year, six-hour storm event. The City shall provide regulations for the use of sedimentation basins and the potential transfer of sediment as beach replenishment (if of an acceptable material).

Policy 14.4: Revegetation and appropriate landscaping of all areas graded and scraped of vegetative cover shall be required with land use and development. Plantings, hydroseeding, and irrigation systems used shall be selected on the bases of minimizing erosion and conserving water.

Policy 14.5: To minimize erosion and allow sedimentation control systems to work, no grading or vegetation removal shall be allowed to occur during the wet season, October 1–April 15, without all systems and devices per an approved erosion control plan and program being in place. During other times of the year such systems shall be provided and operative as required by a comprehensive City erosion control ordinance. No grading shall occur during the rainy season within the Special Study Overlay area, or in areas upland of sensitive areas including lagoons, floodplains, riparian or wetland habitat areas, unless by site-specific determination, the grading

would not be occurring on sensitive slopes, in floodplain areas or upland of floodplains, where sedimentation might occur in other sensitive habitat areas. Then, if grading is determined to be allowable, all necessary erosion control devices, including sedimentation basins, must be in place, and shall be monitored and maintained throughout the grading period.

Policy 14.6: To achieve the ends of erosion control, a comprehensive erosion control plan shall be required with final building permit and improvement plans, subject to review and approval prior to commencement of grading and construction.

Policy 14.7: Minimize extensive or premature grading or filling, and penalize illegal grading or filling.

City of Encinitas Municipal Code

The City's Grading, Erosion, and Sediment Control Ordinance (Municipal Code Chapter 23.24) establishes minimum requirements for grading, excavating, and filling of land to provide for the issuance of grading permits and provides for the enforcement of the requirements. This ordinance was adopted pursuant to, and to implement provisions of, the General Plan and certified Local Coastal Program Land Use Plan (LUP). It is the City's intent to protect life and property and promote the general welfare, enhance and preserve the physical environment of the community, and maintain the natural scenic character of the City. The provisions of this ordinance shall be administered to achieve, to the extent possible, appropriate goals and policies of the General Plan/LUP. Key provisions include, but are not limited to, the following:

- Section 23.24.140 requires that a grading plan be prepared and signed by a California registered civil engineer. If a soils and geology report is required, the grading plan must be signed by a registered soil engineer and a certified engineering geologist.
- Sections 23.24.150 and 23.24.160 require an interim and final erosion and sediment control plan to be included as part of the grading plan by a California registered civil engineer with respect to conditions existing on the site during land-disturbing or filling activities or soil storage and the conditions existing on the site after final structures and improvements (except those required under this section) have been completed and where these final structures have not been covered by an interim plan.
- Section 23.24.170 states that a soil engineering report, when required by the City Engineer, shall be prepared and certified by a California registered soils engineer and shall be based on adequate and necessary test borings.

- Section 23.24.180 requires the preparation of an engineering geology report in accordance with Ordinance 2008-03. In addition to a soils report, an engineering geology report is required when the City Engineer determines that the proposed development is in an existing or a potential geological hazardous area. A geological hazardous area is referred to as an area subject to landslide, faulting, or other hazards identified by the City Engineer. The report must be prepared by a California certified engineering geologist and California certified civil engineer or geotechnical engineer and is to be based on adequate and necessary test borings.

City of Encinitas Housing Element 2019

In March 2019, the City Council adopted the Housing Element Update (HEU) which provides the City with a coordinated and comprehensive strategy for promoting the production of safe, decent, and affordable housing for all within the City. The purpose of the HEU is to ensure that the City establishes policies, procedures, and incentives to increase the quality and quantity of the housing supply in the City. The Housing Plan Update 2019 includes the 2013 - 2021 Housing Element Update and a series of discretionary actions to update and implement the City's Housing Element. The City received Local Coastal Program (LCP) Amendment approval for the HEU from the California Coastal Commission in September 2019, and certification from the State Department of Housing and Community Development (HCD) in October 2019.

As part of the approvals, the project site [Cannon Property (Piraeus) - Site Number 02" in the City's Housing Element] was designated with an R-30 overlay (maximum 30 dwelling units per net acre). Relevant policies and goals related to hazards and hazardous materials are provided below:

GOAL 1:	**The City will encourage the provision of a wide range of housing by location, type of unit, and price to meet the existing and future housing needs in the region and City.**
Policy 1.1:	Strive to maintain a balance of housing types in the City.
Policy 1.2:	Strive to provide a wide variety of housing types so that a range of housing needs and types will be made available to existing and future residents.
GOAL 2:	**Sound housing will be provided in the City of Encinitas for all persons.**
GOAL 3:	**The City will encourage the maintenance and preservation of the existing housing stock as well as quality design in new housing.**
Policy 3.1:	Where determined to be dangerous to the public health and safety, substandard units in the City shall be repaired so that they will comply with

the applicable building, safety and housing codes. When compliance through repair is not or cannot be achieved, abatement of substandard units shall be achieved.

Policy 3.2: Enforce the building, safety and housing codes through vigorous code enforcement efforts.

IMPACT ANALYSIS AND MITIGATION MEASURES

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA) Guidelines, the effects of a potential project are evaluated to determine whether they would result in a significant adverse impact on the environment. An EIR is required to focus on these effects and offer mitigation measures to reduce or avoid any significant impacts that are identified. The criteria used to determine the significance of impacts may vary, depending on the nature of the proposed project. According to Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact related to geology and soils if it would:

1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

    a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning map issued by the State Geologist for the area or based on other substantial evidence of a known fault.

    b. Strong seismic ground shaking.

    c. Seismic-related ground failure, including liquefaction.

    d. Landslides.

2. Result in substantial soil erosion or the loss of topsoil.

3. Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

4. Be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.

5. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

6. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

PROJECT IMPACTS AND MITIGATION

RISK OF LOSS, INJURY, OR DEATH INVOLVING RUPTURE OF ALQUIST-PRIOLO FAULT

Impact 3.6-1	**The project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Impacts would be less than significant.**

Southern California, including the project site, is subject to the effects of seismic activity because of active faults that traverse the region. Active faults are defined as those that have experienced surface displacement within Holocene time (approximately the last 11,000 years) and/or are in a state-designated Alquist-Priolo Earthquake Fault Zone. No known active faults transect or project toward the project site, nor is the project site located within an earthquake fault zone mapped by the state. The nearest known active faults are the Newport-Inglewood Fault and Rose Canyon Fault Zone, approximately 13 miles west of the site (Geocon 2022).

Although no active faults traverse the project site, all new development would be required to comply with the requirements of the Alquist-Priolo Fault Zoning Act and the CBC. The CBC requirements address structural seismic safety and include design criteria for seismic loading and other geologic hazards, including criteria for geologically induced loading that govern sizing of structural members, building supports, and materials and provide calculation methods to assist in the design process. The CBC includes provisions for buildings to structurally survive an earthquake without collapsing and measures such as anchoring to the foundation and structural frame design.

Furthermore, the project would prepare, or cause to be prepared, a Final Geotechnical Report which would provide site-specific geotechnical recommendations for each building, including pad compaction levels, foundation requirements, wall footing design parameters, and other recommendations to ensure that all structures are constructed to appropriate engineering requirements. Conformance with these requirements would further minimize or reduce potential safety risks to project occupants.

Because of the distance to the nearest fault and the magnitude of past seismic activity, the project would neither negate nor supersede the requirements of the Alquist-Priolo Earthquake Fault Zoning Act, nor would the project expose people or structures to potentially substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the current Alquist-Priolo Earthquake Fault Zoning Map. Impacts would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

RISK OF LOSS, INJURY, OR DEATH INVOLVING STRONG SEISMIC GROUND SHAKING

Impact 3.6-2	**The project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Impacts would be less than significant.**

Seismic activity poses two types of potential hazards for people and structures, categorized as either primary or secondary hazards. Primary hazards include ground rupture, ground shaking, ground displacement, subsidence, and uplift from earth movement. Secondary hazards include ground failure (lurch cracking, lateral spreading, and slope failure), liquefaction, water waves (seiches), movement on nearby faults (sympathetic fault movement), dam failure, and fires.

The project site is in a seismically active region and could experience ground shaking associated with an earthquake along nearby faults, including the Newport-Inglewood-Rose Canyon Fault Zone. The project site is likely to be subjected to strong ground motion from seismic activity, similar to that of the rest of San Diego County and Southern California, due to seismic activity in the region as a whole. Regardless of seismic activity anticipated to occur on-site, the project would be designed in accordance with CBC requirements that address structural seismic safety.

All new development would be required to comply with the CBC, which includes design criteria for seismic loading and other geologic hazards. These measures include design criteria for geologically induced loading that govern sizing of structural members and provide calculation methods to assist in the design process. Thus, while shaking impacts would be potentially damaging, they would also tend to be reduced in their structural effects due to CBC criteria that recognize this potential. The CBC includes provisions for buildings to structurally survive an earthquake without collapsing and measures such as anchoring to the foundation and structural frame design.

Conformance with CBC and local requirements relative to grading and construction would ensure that the project does not result in exposure of people or structures to potentially substantial

adverse effects involving strong seismic ground shaking. Therefore, impacts would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

RISK OF LOSS, INJURY, OR DEATH INVOLVING SEISMIC-RELATED GROUND FAILURE

Impact 3.6-3	**The project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction. Impacts would be less than significant.**

Liquefaction is the phenomenon whereby soils lose shear strength and exhibit fluid-like flow behavior. Loose granular soils are most susceptible to these effects, with liquefaction generally restricted to saturated or near-saturated soils at depths of less than 50 feet. Liquefaction normally occurs in soils such as sand in which the strength is purely friction. However, liquefaction has occurred in soils other than clean sand. Liquefaction typically occurs under vibratory conditions such as those induced by a seismic event.

Based on the findings of liquefaction analyses conducted as part of the Geotechnical Investigation, the potential for liquefaction on-site is considered low. The site is not located within a state-designated liquefaction hazard zone. Additionally, the County of San Diego Hazard Mitigation Plan maps the site within a zone with a low liquefiable risk (Geocon 2022).

Liquefaction potential is not anticipated at the Very Old Paralic Deposits or Santiago Formation areas due to the dense nature of the materials and lack of groundwater. Perched groundwater was encountered within the on-site alluvium at depths varying from 38 to 49 feet below the ground surface; however, a static groundwater table was not observed in the excavations performed. Existing seepage elevations in the buried alluvial areas may fluctuate seasonally. Areas where perched water or seepage was not encountered may also exhibit groundwater during rainy period; groundwater/seepage conditions are dependent on seasonal precipitation, irrigation, and land use, among other factors, and may vary as a result. Proper surface drainage will therefore need to be considered in the project design (Geocon 2022).

Project design and construction would incorporate standard design measures to address potential seismic-related liquefaction and related effects such as settlement and lateral spreading, including similar types of measures from the CBC as noted above in Impact 3.6-2. With incorporation of such measures into the project design and construction techniques used, potential impacts associated with seismic-related ground failure and liquefaction would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

EXPOSURE TO LANDSLIDES

Impact 3.6-4	**The project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. Impacts would be less than significant.**

Non-seismically induced landslides can be caused by water from rainfall, septic systems, landscaping, or other origins that infiltrate slopes with unstable material. As noted previously, a documented landslide occurred on the project site in 2001 (Appendix G-1). The landslide extends from Piraeus Street at its toe roughly 140 feet into the property to the east.

The landslide debris is unsuitable to be left in place and complete removal would be required during remedial grading operations. Removal of the slope would result in a buttress fill which would mitigate potential future instabilities in this area of the site (Geocon 2022).

With conformance to the CBC and local building codes, as well as engineering recommendations identified in the geotechnical report, the project would not expose people or structures to potential risk of loss, injury, or death involving landslides. Impacts would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

SOIL EROSION OR LOSS OF TOPSOIL

Impact 3.6-5	**The project would not result in substantial soil erosion or the loss of topsoil. Impacts would be less than significant.**

Soil erosion may result during construction of the proposed project, as grading and construction can loosen surface soils and make soils susceptible to the effects of wind and water movement across the surface. A stormwater pollution prevention plan (SWPPP) that specifies best management practices (BMPs) to prevent grading/construction-related pollutants (including sediment from erosion) from contacting stormwater and moving off-site into receiving waters, as well as elimination/reduction of non-stormwater discharges, would be implemented during construction.

Further, all project construction activities would occur in conformance with the recommendations of the stormwater quality management plan (SWQMP), as well as the City of Encinitas BMP Design Manual for compliance with local City and regional municipal separate

storm sewer system (MS4) permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for stormwater management; refer also to Section 3.8, Hydrology and Water Quality, and Appendix I-2 of this EIR. The project would also be subject to requirements of the City of Encinitas Grading, Erosion, and Sediment Control Ordinance (City Municipal Code Section 23.24) and to grading plan conditions of approval, such as repairing/reseeding/replanting eroded areas and adding erosion control blankets, to ensure that the potential for erosion during project construction is minimized and water quality is maintained.

In conformance with the City's stormwater standards and the MS4 Permit, all runoff generated on-site would be conveyed to a proposed biofiltration basin adjacent to Plato Place. The biofiltration basin has been sized for pollution and flow control purposes. Flow rates generated on-site would be controlled via a small low-flow orifice consistent the City's BMP Manual. In larger storm events, runoff not filtered through the engineered soil would be conveyed via an overflow outlet structure consisting of a 3-foot by 3-foot grate located on top of the outlet structure. Runoff conveyed via the outlet structure would bypass the treatment and flow control BMPs and would be conveyed directly to a proposed storm drain system perpendicular to Piraeus Street. In the post-development condition, the site has been designed to attenuate the 100-year storm event and reduce flow rates below that which currently leaving the site today. As a result, no increase in the amount or rate of stormwater runoff from the site would occur with project implementation as required under the MS4 permit, thereby reducing the potential for erosion to occur. Additionally, a homeowners association would be formed and would be responsible for long-term maintenance of the on-site stormwater facilities in perpetuity, as required by the City, to ensure that adverse effects from runoff do not occur.

With conformance to applicable federal, State, and local regulations, and implementation of appropriate construction and post-construction BMPs, the project would not result in substantial soil erosion or the loss of topsoil. Impacts would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

UNSTABLE GEOLOGIC UNIT OR SOIL

Impact 3.6-6	**The project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Impacts would be less than significant.**

Liquefaction and dynamic settlement of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, saturated, granular soils are susceptible to liquefaction and dynamic settlement. Liquefaction is typified by a loss of shear strength in the affected soil layer, thereby causing the soil to behave as a viscous liquid. This effect may be manifested by excessive settlements and sand boils at the ground surface.

Refer also to Impact 3.6-4 above pertaining to the potential for landslides to occur on-site. As stated, the landslide debris remaining on-site is unsuitable to be left in place and complete removal would be required during remedial grading operations. Removal of the slope would result in a buttress fill which would mitigate potential future instabilities in this area of the site (Geocon 2022). Further, based on the Geotechnical Investigation, the potential for liquefaction on-site is considered low due to the presence of dense, Very Old Paralic Deposits and Santiago Formation and planned engineered fill (Geocon 2022).

The alluvial deposits located beneath the southern portion of the site were found to be slightly to moderately compressible when subjected to increased vertical stress. Based on the geotechnical analysis, it is estimated that approximately 4 to 5 inches of settlement could occur without geotechnical provisions. It is therefore recommended that construction of improvements in the area where alluvium is left in place should be delayed until primary consolidation is essentially complete. Settlement monitoring during grading would verify when primary compression has occurred, and improvement construction may commence (Geocon 2022). Such measures would ensure that potential effects due to settlement would be minimized or avoided.

Further, based on the low susceptibility to liquefaction and the formational material units underlying the site, the possibility of earthquake-induced lateral spreading is considered to be low. Subsidence is also not anticipated to be a design factor due to the density of the underlying Very Old Paralic Deposits and Santiago Formation and the lack of groundwater pumping or extraction of other subsurface materials in the surrounding area.

With conformance to CBC and local requirements, combined with recommendations made in the Geotechnical Investigation, the project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-

or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Impacts would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

EXPANSIVE SOILS

Impact 3.6-7	**The project would not be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property. Impacts would be less than significant.**

Expansive soils are clayey soils characterized by their ability to undergo significant volume changes (shrinking or swelling) due to variations in moisture content. Such volume changes can be damaging to structures.

Based on laboratory testing and observations conducted by Geocon, Inc., the majority of the on-site material is expected to have a "very low" to "low" expansion potential, with exception of the Santiago Formation (Geocon 2022). The remainder of the site does not support soils considered to be expansive, as defined in Table 18-1-B of the Uniform Building Code (1994), and therefore, would not be anticipated to experience potential adverse effects related to expansive soils.

The claystone and siltstone layers within the Santiago Formation are anticipated to be "medium" to "high" expansive soils (Geocon 2022). For development proposed in areas where potentially expansive soils may be present, the project would be subject to conformance with standard requirements of the CBC and local building codes, as well as adherence to the engineering design recommendations identified in the *Geotechnical Investigation*. Through project conformance with such measures, potential impacts, and related substantial direct or indirect risks to life or property, would be reduced to **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

SEPTIC TANKS

Impact 3.6-8	**The project would not have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. No impact would occur.**

The project site is located within the service boundaries of the Leucadia Wastewater District. Wastewater generated by the proposed development would be disposed of via the existing public sewer system. Project-generated wastewater flows would be collected on-site and conveyed to a point of connection located off-site in Piraeus Street.

Accordingly, the project would not require septic tanks or alternative wastewater disposal systems. Therefore, **no impact** related to septic tanks or alternative wastewater disposal systems would occur.

Mitigation Measures: None required.

Level of Significance: No impact.

PALEONTOLOGICAL RESOURCES OR UNIQUE GEOLOGIC FEATURES

Impact 3.6-9	**The project would have the potential to directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. Impacts would be less than significant with mitigation incorporated.**

Impacts on paleontological resources occur when excavation activities encounter fossiliferous geological deposits and cause physical destruction of fossil remains. Fossil remains, fossil sites, fossil-producing geologic formations, and geologic formations with the potential for containing fossil remains are all considered paleontological resources or have the potential to be paleontological resources. Fossil remains are considered important if they are well preserved, identifiable, type/topotypic specimens, age diagnostic, useful in environmental reconstruction, and/or represent new, rare, and/or endemic taxa.

The potential for impacts on fossils depends on the sensitivity of the geologic unit and the amount and depth of grading and excavation. The project site is generally underlain by Quaternary-age Very Old Paralic Deposits and Eocene-age Santiago Formation. The Santiago Formation is considered to have a high paleontological sensitivity (SDNHM 2022; Appendix G-3). Anticipated depth of excavation is approximately 33 feet. Therefore, there is a possibility for the unanticipated discovery of paleontological resources during project-related ground-disturbing activities as well as the potential to damage or destroy paleontological resources that may be present below the ground surface. This would constitute a significant impact. Mitigation measure

GEO-1 would address the inadvertent discovery of previously unknown paleontological resources. Impacts would be reduced to **less than significant with mitigation incorporated**.

Mitigation Measure:

GEO-1 **Paleontological Data Recovery and Monitoring Plan.** A Data Recovery and Monitoring Plan shall be prepared to the satisfaction of the City. The plan shall document paleontological recovery methods.

1. Prior to grading permit issuance, the project applicant shall implement a paleontological monitoring and recovery program consisting of the following measures, which shall be included on project grading plans to the satisfaction of the Development Services Department:

    a. The project applicant shall retain the services of a qualified paleontologist to conduct a paleontological monitoring and recovery program. A qualified paleontologist is defined as an individual having an MS or PhD degree in paleontology or geology, and who is a recognized expert in the identification of fossil materials and the application of paleontological recovery procedures and techniques. As part of the monitoring program, a paleontological monitor may work under the direction of a qualified paleontologist. A paleontological monitor is defined as an individual having experience in the collection and salvage of fossil materials.

    b. The qualified paleontologist shall attend the project preconstruction meeting to consult with the grading and excavation contractors concerning the grading plan and paleontological field techniques.

    c. The qualified paleontologist or paleontological monitor shall be on-site during grading and/or excavation of previously undisturbed deposits of moderate and high sensitivity geologic units (e.g., Santiago Formation) to inspect exposures for any contained fossils. If the qualified paleontologist or paleontological monitor ascertains that the noted formations are not fossil-bearing, the qualified paleontologist shall have the authority to terminate the monitoring program. The paleontological monitor shall work under the direction of a qualified paleontologist. An adaptive approach is recommended, which involves initial part-time paleontological monitoring (e.g., up to 4 hours per day). As the project proceeds, the qualified paleontologist shall evaluate the monitoring results and, in consultation with the City and subject to the City's consent, may revise the monitoring

schedule (i.e., maintain part-time monitoring, increase to full-time monitoring, or cease all monitoring).

d. If fossils are discovered, recovery shall be conducted by the qualified paleontologist or paleontological monitor. In most cases, fossil salvage can be completed in a short period of time, although some fossil specimens (such as a complete large mammal skeleton) may require an extended salvage period. In these instances, the paleontologist (or paleontological monitor) shall have the authority to temporarily direct, divert, or halt grading to allow recovery of fossil remains in a timely manner.

e. If subsurface bones or other potential fossils are found anywhere within the project site by construction personnel in the absence of a qualified paleontologist or paleontological monitor, the qualified paleontologist shall be notified immediately to assess their significance and make further recommendations.

f. Fossil remains collected during monitoring and salvage shall be cleaned, sorted, and catalogued. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, shall be deposited (as a donation) in a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum.

2. Prior to building permit issuance, a final summary report outlining the results of the mitigation program shall be prepared by the qualified paleontologist and submitted to the Development Services Department for concurrence. This report shall include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of recovered fossils, as well as appropriate maps.

Level of Significance: Less than significant with mitigation incorporated.

CUMULATIVE IMPACTS

Impact 3.6-10	**The project would have the potential to result in a significant cumulative impact related to geology and soils. Impacts would be less than cumulatively considerable.**

Geographic Scope

Risks related to geology and soils are typically localized in nature because they tend to be related to on-site conditions or conditions caused by a project's construction. Cumulative projects that have the potential to be considered in a cumulative context with the project's incremental contribution, and that are included in the analysis of cumulative impacts relative to geology and soils, are identified in Tables 3.0-1 and 3.0-2 and Figure 3.0-1 in Section 3.0 of this EIR. Cumulative projects were chosen based on proximity to the project. The majority of the cumulative projects would generally be similar to the proposed project regarding construction and operational activities. These selection factors are appropriate in the context of geology and soils cumulative impacts because generally there needs to be a direct nexus and similar geologic conditions for a synergistic impact to occur, such as site modifications at nearby projects combining to destabilize soils. Currently, there is not a known existing significant cumulative impact related to geology and soils within this geographic scope.

Potential Cumulative Impacts

As discussed above, like much of Southern California, the project site is located in a seismically active area. All areas of San Diego County are considered seismically active to a lesser or greater extent depending on their proximity to active regional faults. Impacts of the proposed project would be cumulatively considerable if the project, combined with related projects, resulted in significant cumulative impacts. However, the effects of the cumulative projects are not of a nature to cause cumulatively significant effects from geologic impacts, or on soils, because such impacts are site-specific and would only have the potential to combine with impacts of the proposed project if they occurred in the same location.

The proposed project would require grading of portions of the subject property to allow for development as proposed. The resulting project site would generally not be visually or topographically different from existing development surrounding the project site. Although construction activities would have the potential to result in erosion on the project site, adherence to the recommendations in the geotechnical report and other state and local grading and building requirements would mitigate erosion impacts to less than significant levels. Other cumulative projects would adhere to similar requirements, thereby minimizing cumulative scenario erosion

impacts. Any planned projects in the vicinity of the proposed project would be subject to environmental review and would be required to conform to the City's General Plan and the CBC.

Other projects may be located in areas considered sensitive for paleontological resources. Such projects would be required to implement mitigation similar to mitigation measure **GEO-1** to reduce potential impacts to paleontological resources to less than significant levels. With adherence to grading and building requirements, the project would not contribute to cumulative impacts for geologic, seismic hazards, or related events because the proposed project and other cumulative projects in the area would be required to demonstrate compliance with local, state, and federal building and safety standards prior to City issuance of grading and/or building permits. As a result, cumulative impacts related to geology and soils would be **less than cumulatively considerable.**

Mitigation Measures: Implement mitigation measure **GEO-1.**

Level of Significance: Less than cumulatively considerable.

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